JOHNS HOPKINS INTERNATIONAL

INTERNATIONAL TRAINING PROGRAM FOR IMAGE-GUIDED SURGERY

PROVIDED BY THE DEPARTMENT OF INTERVENTIONAL RADIOLOGY AT THE JOHNS HOPKINS HOSPITAL

The Johns Hopkins Training Group for Image-Guided Procedures ("JHIP") is dedicated to improving the quality of human life and healthcare through facilitating the development of minimally invasive image-guided treatment centers worldwide, by providing high quality on-site training for all members of the healthcare team.

The training program covers the complete range of image-guided procedures, the pre- and post-procedural care, the different products available to perform these procedures, and equipment and inventory optimization guidelines. The physicians, nurses and technicians of the JHIP team deliver the program on-site via multi-media lectures, hands-on training, and operations assessment. Current "training programs" at academic centers do not allow the attendees to have "hands-on" patient procedural training due to credentialing requirements. This program offers the clear benefit of allowing the trainees to perform the procedures under the direct supervision and guidance of a highly trained team, in the trainees' environment, with their equipment, their staff, their resources, and their patients. Moreover, having doctors teach doctors, nurses teach nurses, and technologists teach technologists is both a credible and efficient means of education. Additionally, the JHIP team will be available for follow up visits and for consultation after completion of the training program.

Topics

Comprehensive multi-media lectures
Content and structure of the lectures are tailored to the needs of the hosting institution. The JHIP Program offers lectures covering the following areas:

- Procedural protocols
- Patient management
- Patient monitoring/sedation
- Imaging equipment optimization
- Inventory management
- Product selection
- Billing
- Use of physician extenders
- Importance of having admitting privileges
- Importance of outpatient clinic

Hands-on procedural training
New minimally invasive image-guided techniques and products are introduced under the supervision of the JHIP team. Presented procedures include, but are not limited to:

- **Treatment of peripheral arterial occlusive disease with angioplasty and stent placement (renals, carotids, iliacs, subclavians, infra-inguinal vessels)**
  Many people suffer from narrowing of the arteries in their arms, legs, neck and blood vessels that supply the kidney. By using a simple outpatient procedure such as angioplasty (using a balloon to open the blood vessel) or by placing a wire mesh stent to keep the blood vessel open, these patients who are afflicted with this disease can have significant improvement in their quality of life and prevent future amputations.

- **Endovascular treatment of aortic aneurysms and aortic dissections (abdominal, thoracic)**
  With the advent of stent grafts (wire mesh tubes that are covered with fabric), the treatment of life-threatening aortic aneurysms has changed from a major operation requiring intensive care unit monitoring, hospital stays of 7 to 10 days, and significant patient rehabilitation to a procedure that does not require ICU monitoring and the patients are out of the hospital within 2 to 3 days and returning to normal functioning within 5 to 6 days. Likewise, aortic dissections that have a significant surgical mortality can be treated with minimally invasive surgery to achieve the desired results. Treatments for dissections include stent graft placement, aortic fenestration's, and stent placement within involved branch vessels.

- **Image guided surgery for liver cancer**
  Hepatocellular carcinoma is the most prevalent malignancy worldwide. By using catheter-based techniques, high doses of chemotherapy can be injected into the artery directly supplying the tumor. This has significantly improved patient outcome. Likewise, hepatocellular carcinoma can be treated with RF ablation where a probe is

inserted through the skin into the tumor of the liver and the probe is connected to a generator which heats the tumor and causes tumor cell death. Techniques for percutaneous cholangiography and biliary stent placement can significantly improve the immediate survival of patients with cholangiocarcinoma, pancreatic carcinoma, or metastatic disease that involves the liver and bile ducts.

- **Treatment of vascular malformations**
  Arterial venous and venous malformation can significantly threaten a limb's viability and cause significant disfigurement. Using percutaneous treatments with ethanol, glue, and other embolic agents, these malformations can be "blocked off" so that they no longer affect the patient.

- **Tunneled central venous access catheter placement**
  Central venous access is an important service provided by image guided surgeons to hospitalize patients requiring dialysis and chemotherapy. Placement using image-guided techniques is faster, safer and less expensive than traditional surgical techniques. This is particularly true in patients that have had multiple venous access attempts and may have occluded blood vessels.

- **Percutaneous biopsy techniques (liver, lung, any organ)**
  Using ultrasound or CT guidance, suspected tumor lesions can be quickly and easily biopsied through a 1 mm hole in the skin. Moreover, patients with significant liver disease benefit from a transjugular liver biopsy which does not expose the patient to any significant risk of bleeding as opposed to the traditional transcutaneous biopsy techniques as these patients usually have abnormal coagulation parameters.

- **Treatment of portal hypertension**
  Portal hypertension is a significant cause of morbidity and mortality worldwide. By placing a TIPS (transjugular intrahepatic portosystemic shunt), these patients can be managed without the need for a large abdominal operation. A TIPS is a stent (a wire mesh tube) that connects the portal vein to the inferior vena cava through a tract created through the liver. Similarly, patients that have significant upper gastrointestinal bleeding can be treated with embolization of the esophageal varices, which causes thrombosis and cessation of hemorrhage.

- **Embolization techniques**
  Active bleeding either from a traumatic source, peptic ulcer disease or diverticulitis can be managed using image guided surgery with embolization of the bleeding blood vessel, thus saving the patient from an emergent trip to the operating room with bowel resection or arterial reconstruction. Women with uterine leiomyomas (fibroids) often suffer from dysfunctional uterine bleeding, anemia and mass-like symptoms. By embolizing both uterine arteries, these symptoms are treated and the fibroids typically shrink by 50%. This saves the patient from needing to undergo a hysterectomy.

Other presented techniques:

- **Abscess drainage**
- **Angiography**
- **Catheter directed thrombolysis for arterial and veno-occlusive disease**
- **Hemodialysis access care (fistulas)**
- **Venous stenting**
- **Percutaneous nephrostomies**
- **Gastrostomy tubes**
- **Gastro-jejunostomy tubes**
- **Percutaneous arteriotomy closure devices**

Patient monitoring and sedation

All procedures are performed under conscious sedation using versed and fentanyl. Safe and effective usage of these medications is essential to a successful image guided surgery program. A patient who is well sedated is more cooperative and has an overall better view of the procedure when the procedure is completed.

Imaging equipment and inventory optimization

The Johns Hopkins team will evaluate the imaging equipment and inventory present at the host institution and make recommendations on how to either optimize these equipment and inventory resources or maximize these resources to perform the desired procedures.

Duration

Depending on the selected topics, the program can range from 2 to 5 days, including 2-4 hours of lecture and 4-6 hours of hands-on training daily.

Comprehensive follow-up

All lectures, protocols, and inventory suggestions will be provided on CD-ROM to the hosting institution for reference. The JHIP Team will be available via pager and/or email for consultation 24 hours/day, 7 days/week. And a 6-month visit will be performed to assess success of program and address additional questions.

Requirements

Basic imaging equipment (e.g. C-arm), an operating theatre and anesthesiology with intensive care background is required at the host institution to administer the program. Prior to the site visit, the hosting institution is required to provide the JHIP team with the following information:

- Selected topics for training from course selection manual
- Population demographics within their healthcare delivery area
- Qualifications and degrees of their healthcare team
- Equipment specifications
- On-site product inventory